AMENDMENTS

In the Specification

On page 1, please **REPLACE** the section entitled "CROSS-REFERENCE TO RELATED PATENT APPLICATIONS" with the following section:

This is application is a divisional application U.S. Patent Application Serial Number 09/741,721, filed December 18, 2000, now issued as U.S. Patent No. 6,599,694.

~~This application is related to PCT patent application serial number PCT/US/00/13154, filed May 12, 2000 in the name of Sabry et al. It is also related to U.S. Patent Application Serial number 09/?, filed on December 4, 2000 in the name of Vaisberg and Coleman. Both applications are incorporated herein by reference for all purposes.~~

Beginning on page 31, please **REPLACE** the section entitled "SOFTWARE/HARDWARE" with the following section:

Generally, embodiments of the present invention employ various processes involving data stored in or transferred through one or more computer systems. Embodiments of the present invention also relate to an apparatus for performing these operations. This apparatus may be specially designed and constructed for the required purposes, or it may be a general-purpose computer selectively activated or configured by a computer program, programmed logic, and/or data structure stored in the computer. The processes presented herein are not inherently related to any particular computer or other apparatus. In particular, various general-purpose machines may be used with programs written in accordance with the teachings herein, or it may be more convenient to construct a more specialized apparatus to perform the required method steps. A particular structure for a variety of these machines will appear from the description given below.

In addition, embodiments of the present invention relate to computer readable media or computer program products that include program instructions and/or data (including data structures) for performing various computer-implemented operations. Examples of computer-readable media include, but are not limited to, magnetic media such as hard disks, floppy disks, and magnetic tape; optical media such as CD-ROM disks; magneto-optical media; semiconductor memory devices, and

hardware devices that are specially configured to store and perform program instructions, such as read-only memory devices (ROM) and random access memory (RAM). The data and program instructions of this invention may also be embodied on a carrier wave or other transport medium. Examples of program instructions include both machine code, such as produced by a compiler, and files containing higher level code that may be executed by the computer using an interpreter.

Figure 6 illustrates a typical computer system that, when appropriately configured or designed, can serve as an experimental control and/or image analysis apparatus of this invention. The computer system 600 includes any number of processors 602 (also referred to as central processing units, or CPUs) that are coupled to storage devices including primary storage 606 (typically a random access memory, or RAM), primary storage 604 (typically a read only memory, or ROM). CPU 602 may be of various types including microcontrollers and microprocessors such as programmable devices (e.g., CPLDs and FPGAs) and unprogrammable devices such as gate array ASICs or general-purpose microprocessors. As is well known in the art, primary storage 604 acts to transfer data and instructions uni-directionally to the CPU and primary storage 606 is used typically to transfer data and instructions in a bi-directional manner. Both of these primary storage devices may include any suitable computer-readable media such as those described above. A mass storage device 608 is also coupled bi-directionally to CPU 602 and provides additional data storage capacity and may include any of the computer-readable media described above. Mass storage device 608 may be used to store programs, data and the like and is typically a secondary storage medium such as a hard disk. It will be appreciated that the information retained within the mass storage device 608, may, in appropriate cases, be incorporated in standard fashion as part of primary storage 606 as virtual memory. A specific mass storage device such as a CD-ROM 614 may also pass data uni-directionally to the CPU.

CPU 602 is also coupled to an interface 610 that connects to one or more input/output devices such as such as video monitors, track balls, mice, keyboards, microphones, touch-sensitive displays, transducer card readers, magnetic or paper tape readers, tablets, styluses, voice or handwriting recognizers, or other well-known input devices such as, of course, other computers. Finally, CPU 602 optionally may be coupled to an external device such as a database or a computer or telecommunications network using an external connection as shown generally at 612. With such a connection, it is contemplated that the CPU might receive information from the network, or might output information to the network in the course of performing the method steps described herein.

In one embodiment, the computer system 600 is directly coupled to (or forms part of) an image acquisition system such as an optical imaging system that captures images of cells. Digital images from the image generating system are provided via interface 612 for image analysis by system 600. Alternatively, the images processed by system 600 are provided from an image storage source such as a database or other repository of cell images. Again, the images are provided via interface 612. Once in the image analysis apparatus 600, a memory device such as primary storage 606 or mass storage 608 buffers or stores, at least temporarily, digital images of the cell. Typically, the cell images will show locations where certain cell markers exist within the cells. In these images, local values of an image parameter (e.g., radiation intensity) associated with a cell marker correspond to amounts or levels of the marker at the locations within the cell shown on the image. With this data, the image analysis apparatus 600 can perform various image analysis operations such as extracting relevant parameters from the cell images, generating the quantitative phenotypes from the relevant parameters, comparing quantitative phenotypes with standards and with quantitative phenotypes from other cell types employed in the studies, and storing the phenotypic information in a database. To this end, the processor may perform various operations on the stored digital image.

Figure 7 is a simplified diagram of a complete system 710 for evaluating a biological condition according to an embodiment of the present invention. This diagram is merely an example and should not limit the scope of the claims herein. The system 710 includes a variety of elements including a computing device 713, which is coupled to an image processor 715 and is coupled to a database 721. The image processor receives information from an image capturing device 717, which image processor and image capturing device are collectively referred to as the imaging system herein. Suitable imaging systems are discussed in PCT PCT/US00/13154, filed May 12, 2000 in the name of Sabry et al.,[previously] incorporated herein by reference. **See also, US Patent Application number 09/729,754, filed on December 4, 2000 in the name of Vaisberg and Coleman, which is incorporated herein by reference.** The image-capturing device obtains information from a plate 719, which includes a plurality of sites for cells. These cells can be biological cells that are living, fixed, dead, cell fractions, cells in a tissue, and the like. The computing device retrieves the information, which has been digitized, from the image processing device and stores such information into the database. A user interface device 711, which can be a personal computer, a work station, a network computer, a personal digital assistant, or the like, is coupled to the computing device.

Although the above has generally described the present invention according to specific processes and apparatus, the present invention has a much broader range of applicability. In particular, the present invention is not limited to a particular kind of data about a particular cell, but can be applied to virtually any cellular data where an understanding about the workings of the cell is desired. Thus, in some embodiments, the techniques of the present invention could provide information about many different types or groups of cells, substances, and genetic processes of all kinds. Of course, one of ordinary skill in the art would recognize other variations, modifications, and alternatives.